



**IRRIGATION AND WATERWAYS DIRECTORATE
GOVERNMENT OF WEST BENGAL
MECHANICAL & ELECTRICAL DIVISION, MIDNAPORE
Khasjungle, P.O-Abas, District- Paschim Medinipur, Pin: 721102.**

Memo No. 17/ 3T-1(e)

Date: 18.01.2023.

[Invitation for Expression of Interest for Budgetary Quotation]

EOI No WBIW/EE/MEDM/EOI-02/2022-23

Dates of this E.O.I:

Sl No	Particulars	Dates
01	Start Date of Issuance of EOI Document	19.01.2023
02	Last date of submission of Queries	31.01.2023
03	Pre bid meeting	02.02.2023
04	Issue of Corrigendum	03.02.2023
05	Last Date of Issuance EOI Document	07.02.2023
06	Last Date and time for Submission of EOI	20.02.2023

NAME OF THE WORK:

Supply, installation, testing and commissioning including trial run of six (6) nos. dry installed non clog centrifugal submersible (flood proof) pump of capacity 20 Cusec (2040 M3/Hr) (each) in connection with the work of "Supply, installation, testing and commissioning including trial run of six (6) nos. dry installed non clog centrifugal submersible (flood proof) pump of capacity 20 Cusec (2040 M3/Hr) (each) with allied electromechanical work, Piping, valves, etc complete of the Ranichak pumping station, P.S: Daspur, Dist. Paschim Medinipur".

EXECUTING DIVISION: Mechanical & Electrical Division, Midnapore.

YEAR: 2022-23

1.0 Invitation for EOI/Single stage of Bidding

The Executive Engineer, Mechanical & Electrical Division Midnapore invites EOI from prospective bidders(OEMs Only) for the work Supply, installation, testing and commissioning including trial run of six (6) nos. dry installed non clog centrifugal submersible (flood proof) pump of capacity 20 Cusec (2040 M3/Hr) (each) in connection with the work of "Supply, installation, testing and commissioning including trial run of six (6) nos. dry installed non clog centrifugal submersible (flood proof) pump of capacity 20 Cusec (2040 M3/Hr) (each) with allied electromechanical work, Piping, valves, etc complete of the Ranichak pumping station, PS. Daspur, Dist. Paschim Medinipur."

The successful Bidder will carry out the scope of work in accordance with the specifications provided in a detailed Request for e-NIT document which will be brought out by the Executive Engineer, Mechanical & Electrical Division, Midnapore in later stage after obtaining administrative approval of the work. Now, Executive Engineer, Mechanical & Electrical Division, Midnapore seeks EOI for budgetary quotes from Bidders of repute for the above work from Bidders who meet the pre-qualification criteria specified in this document will be short-listed to have comparison of cost between various prospective bidder. In case of non-compliance they may offer their own solution.

2.0 Description of the Project:

2.1 Introduction to the project:

This pumping station is situated at Ranichak under Block- Daspur-II, P.S- Daspur in the District of Paschim Medinipur. It plays an important role in draining out rain water of upper and lower Block of Daspur-II and water from Ghatal P.S area which cause damage of Amon crops of 12 Sq. Mile area, thereby giving relief to the cultivators& villagers of several Mouzas of the area. This Pumping station has 12 Nos 20 Cusec (100 HP Motor) mixed flow type centrifugal pump. Each 06 Nos pumps are installed in parallel and discharged through a common header pipe of 1200 mm diameter to the river Rupnarayan.

During flood period the pump house with adjoining area with all electrical installation are inundated and motors with pump are totally submerged for more than one month. As a result, the pump house remains inoperative during this period. Considering this situation

and due to lack of effectiveness and operational difficulties, 06 Nos centrifugal pump (Out of 12 Nos) has been replaced by 06 Nos Dry installed, non-clog, centrifugal Submersible Pump (Flood proof) of capacity 20 Cusec each in the year 2020-21. Now, this year, remaining 06(six) Nos existing old centrifugal pumps has been considered to be replaced by 06 Nos flood proof submersible pump of capacity 20 Cusec each.

2.2 Hydraulic Data of the proposed pumping station:

Here the inlet canal will act as inlet pond. The shape and configuration are adopted in such a way that there is streamline flow entry into the Pump House and keeping the centre line elevation of discharge pipe at elevation at (+) 5.785 M which is much above the FDL at outlet channel, the other levels as per Hydraulic Institute Standard (HIS).

Sump bottom level= (-) 1.37 M

C/L of discharge pipe (above HWL) = (+) 5.785 M

2.3 Selection of the Pumping Station:

For selection and installation of alternate pump, suitable for dry and submerged condition, the following parameters are to be considered.

- a) Different mode of installation, using existing structure of the pump house.
- b) Piping layout, which includes suction piping and discharge piping.
- c) Availability of floor space.
- d) Modification of existing intake sump.
- e) Changes in the outdoor
- f) Relocation of Starter Panel.

Considering the existing construction of pump house i.e., suitable for dry type installation, final selection is limited to 12 nos. 20 cusec non-Clog type submersible pump with dry pit installation, with total drainage capacity of 240 cusec.

2.4 Selection the Type of Pump:

The pump shall be of vertical shaft, single stage, single flow, flood proof, dry pit type suitable for handling drainage/storm water containing loose slit, gritty and floating matter

complete with suction, volute casing, discharge and base plate with all accessories as applicable , driven by single speed vertical solid shaft flange mounted motor.

The pump head referred above is inclusive of all losses in the discharge in common header and pipeline of the pump, inlet losses in, discharge head for individual pump shall be calculated by the bidder and included in the design head of bowl assembly. The pump shall have stable performance throughout the whole range of its operation i.e. from zero flow to run out condition. The pump of particular category shall be identical and shall be suitable for continuous operation. The flow rate and minimum submergence for continuous operation and maximum allowable dry running period of the Pump shall be stated in their offered bid. The design, manufacture and performance of the pumps shall conform to the latest version of IS/BS/DIN Standards / Specification. In particular, the equipment shall conform to the latest revision of the following specification.

IS: 1710: - Specification of pumps-vertical turbine mixed and axial flow.

IS 5120: - Technical requirement for rotodynamic special purpose pumps.

And Hydraulic Institute Standards, USA.

3.0 Indicative scope of work:

Supply, installation, testing and commissioning including trial run of six (6) nos. dry installed non clog centrifugal submersible (flood proof) pump of capacity 20 Cusec (2040 M³/Hr) (each) of which defect liability period is Five (05) years with allied Electro-mechanical equipments complete with the proposed pumping station. The works are to be executed as per technical specification given in the foregoing.

4.0 Instructions to Bidders:

4.1 Bidders are advised to study all instructions, B.O.Q, forms, terms, requirements and other information in the EOI documents carefully. Submission of the bid shall be deemed to have been done after careful study and examination of the E.O.I documents with full understanding of its implications. Rate should be quoted inclusive of all taxes and duties.

4.2 The response to this E.O.I should be full and complete in all respects. Failure to furnish all information required by the E.O.I documents or submission of a proposal not substantially responsive to the E.O.I documents in every respect will be at the bidder's risk and may result in rejection of its proposal.

4.3 For better understanding of work, brief description of work as per our preliminary assessment are given for better understanding of the project. In this stage bidder are requested to propose their work description, with quoting rate , so that in later stage under detailed NIT, complete scope of work and technical specification may be enclosed , so that bid may be evaluated on equal footing.

4.4 The Bidder shall be deemed to be fully conversant with the site conditions and the nature and complexity of the work to be undertaken and taking into account all eventualities which can arise before, during and after project execution.

4.5 Bid validity shall be 150 days.

5.0 EOI proposal preparation, costs & related issues:

5.1 The Bidder is responsible for all costs incurred in connection with participation in this process, including, but not limited to, costs incurred in conduct of informative and other diligence activities, participation in meetings/discussions/presentations, preparation of proposal, in providing any additional information required by this office to facilitate the evaluation process, unless explicitly specified to the contrary.

Purchaser will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

5.2 These Expression of Interest (EOI) are purely for estimation purpose and to know the present market rate and under no circumstance, It shall be construed as quotation for placing the supply order. For competitive bidding separate notice inviting Tender will be published.

6.0 Pre-bid Meeting

6.1 Superintending Engineer , South- West Mechanical & Electrical Circle, shall hold a pre-bid meeting with the prospective Bidders on <02.02.2023 at 13:00 Hrs > at <O/O Superintending Engineer ,South-West Mechanical & Electrical Circle , DVC New Colony ,Durgapur-2, Burdwan > The Bidders will ensure that their queries with regard to the EOI, to be addressed to the EOI issuing Authority during the Pre-Bid meeting shall reach by post, facsimile or E-mail on or before <15.12.2022 at 14:00 Hrs > to the officer whose details are provided below (Nodal Officer):

Office of the Executive Engineer
Mechanical & Electrical Division, Midnapore,
Khasjungle, P.O-Abas, District- Paschim Medinipur.

Pin: 721102

E-mail: ee.midmched-wb@wbiwd.gov.in, medm.midnapur@gmail.com

Mobile: 9475851824

7.0 Responses to pre-bid queries and issue of corrigendum:

The Nodal Officer notified by the EOI issuing authority will endeavour to provide timely response to all queries. However, the department makes no representation or warranty as to the completeness or accuracy of any response made in good faith.

7.1 At any time prior to the last date for receipt of bids, EOI inviting authority may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the EOI document by issuing a corrigendum.

7.2 The corrigendum (if any) & clarifications to the queries from all Bidders will be posted on the <<https://wbtenders.gov.in>>, (www.wbiwd.gov.in) and emailed to all participants of the pre -bid conference.

7.3 Any such corrigendum shall be deemed to be incorporated into this EOI.

7.4 In order to afford prospective Bidders reasonable time in which to take the corrigendum into account in preparation of their bids, Purchaser may, at its discretion, extend the last date for the receipt of EOI Bids.

8.0 Right to terminate the EOI process:

8.1 EOI issuing authority may terminate the EOI process at any time without assigning any reason. EOI issuing authority makes no commitments, expression or implied that this process will result in a business transaction with anyone.

9.0 Bid Submission Procedure

Bidders shall submit their bid through online on e-Procurement portal.

Bidders should submit their responses to an EOI as per the procedure specified in the e-Procurement portal (specified URL) being used for this purpose.

The bidder must ensure that the bid is digitally signed by the Authorized Signatory of the bidding firm and has been duly submitted (freezed) within the submission timelines.

The Department will in no case be responsible if the bid is not submitted online within the specified timelines.

All the pages of the Proposal document must be sequentially numbered and must contain the list of contents with page numbers. Any deficiency in the documentation may result in the rejection of the Bidder's Proposal.

10.0 Short listing criteria:

10.1 Purchaser will shortlist Bidders who meet the pre-qualification criteria mentioned in this EOI.

10.2 Any attempt by a bidder to influence the bid evaluation process may result in the rejection of its EOI proposal.

11.0 Evaluation Process:

11.01 Superintending Engineer, South-West Mechanical & Electrical Circle, DVC New Colony, Durgapur-2, Burdwan will constitute a committee to evaluate the responses of the Bidders in response to this EOI document (Tender Committee).

11.02 The Tender Committee constituted by the Superintending Engineer, South-West Mechanical & Electrical Circle, shall evaluate the responses to the EOI and all supporting documents & documentary evidence. Inability to submit requisite supporting documents or documentary evidence, may lead to rejection of the Bidder's EOI proposal.

11.03 Each of the responses shall be evaluated to validate compliance of the Bidders according to the pre-qualification criteria, forms and the supporting documents specified in this EOI document.

11.04 The decision of the Tender Committee in the evaluation of responses to the EOI shall be final. No correspondence will be entertained outside the evaluation process conducted by the Purchase Committee.

11.05 The Tender Committee may ask for meetings with the Bidders to evaluate its suitability for the assignment

11.06 The Tender Committee reserves the right to reject any or all proposals.

12.0 Pre-qualification evaluation criteria:

#	Basic requirement	Specific requirements	Documents required
1	Legal Entity	<ul style="list-style-type: none"> - Should be a company registered under the provisions of the Indian Companies Act, 2013 or a partnership firm registered under the Indian Partnership Act, 1936 or the Limited Liability Partnerships Act, 2008. - Registered with the GST authorities. - Should have been operating for the last three years. 	<ul style="list-style-type: none"> - Certificate of incorporation / Partnership deed - GST registration - Certificate of commencement of business (if applicable)
2	Board resolution / Power of attorney in favour of authorised signatory	A board resolution OR power of attorney in the name of the person executing the bid, authorizing the signatory to commit the Bidder.	Board resolution; OR Power of attorney with appropriate supporting documents
3	Sales turnover	<p>Annual sales turnover generated from services related to system integration during each of the last three financial years (as per the last published Balance sheets), should be at least INR<value in numbers and words>.</p> <p>This turn over should be on account of Information Communication Technology (ICT) systems development and implementation (i.e. revenue should be on account of system integration/turnkey solutions or products and their associated maintenance or implementation services, packaged software etc.)only</p>	<p>Extracts from the audited balance sheet and profit & loss;</p> <p>OR</p> <p>Certificate from the statutory auditor</p>

4	Technical capability	<p>Bidder must have successfully completed at least the following numbers of work for Manufacturer, supply of floating trash skimmer equipment (with or without O&M) of value specified herein:</p> <ul style="list-style-type: none"> - One project of similar nature not less than the amount <value equal to 80% of quoted cost>;OR - Two projects of similar nature not less Than the amount equal<valueequalto60% of quoted cost>;OR - Three projects of similar nature not less than the amount equal<valueequalto40% of quoted cost 	<p>Completion certificates from the competent authority ; OR Work order + Self certificate of completion (Certified by the statutory auditor)</p>
5	Debarment	<p>Debarment should used as a mandatory Pre-Qualification criterion to restrict organizations that have been either debarred by the tendering department for breach of ethical conduct or fraudulent practices, etc. As specified in Rule 151of GFR.</p>	<p>Self Certified letter that the bidder(or any of its successor)is not in the active debarred list published by:</p> <ul style="list-style-type: none"> a) Central/ State Public Procurement Portal; and

13.0 Examination of Bids and Determination of Responsiveness:

The Bid evaluation committee (TEC) will evaluate whether each Bidder is satisfying the eligibility and qualifying criteria prescribed in the pre-qualification document and declare names of the qualified Bidders.

Prior to the details evaluation, the tender accepting authority will determine the substantial responsiveness of each bid to the bidding documents. For purposes of these clauses, a substantially responsive bid is one which conforms to all the terms and conditions of the bidding documents without material deviations. For that purpose a separate sheet for Guaranteed Technical Particulars are attached.

Assessment: The detailed assessment for pre-qualification shall be based on the following information submitted by the Bidder:

1. Data submitted in prescribed format given in tender documents.

2. Bidder's techno-commercial proposals for carrying out the entire works in accordance with the specifications in this document.

The techno-commercial submissions must principally demonstrate the adequacy of bidders' appreciation of the:

--The project

--Design and detail engineering

--The methods proposed for mobilization and establishment of site installation and for the timely completion, testing and commissioning and O&M of the project.

--The arrangements for the logistic support for completion, testing and commissioning of all works of the project.

--Requirements of the Department.

14.0 Format for letter of response:

To

The Executive Engineer

Mechanical & Electrical Division, Midnapore.

Khasjungle, P.O- Abas, Dist- Paschim Medinipur.

Pin-721102

Sub: - RESPONSE TO – EOI

Dear Sir,

We, the undersigned, offer the following information in response to the Expression of Interest sought by you vide your EOI No. Dated

1. We are duly authorized to represent and act on behalf of _____
(here in after the “respondent”)
2. We have examined and have no reservations to the EOI Document including Addenda No(s) _____
3. I/We understand that
 - a) this EOI is intended for the work “Supply, installation, testing and commissioning including trial run of six (6) nos. dry installed non clog centrifugal submersible (flood proof) pump of capacity 20 Cusec (2040 M3/Hr) (each) in connection with the work of "Supply, installation, testing and commissioning including trial run of six (6) nos. dry installed non clog centrifugal submersible (flood proof) pump of capacity 20 Cusec (2040 M3/Hr) (each) with allied electromechanical work, Piping, valves, etc complete of the Ranichak pumping station, PS. Daspur, Dist. Paschim medinipur" by Irrigation and waterways Department , Govt. of West Bengal.
 - b) Irrigation and waterways Department , Govt. of West Bengal may float a separate Tender (based on their requirement) , with all conditions like Eligibility Criteria , and our participation in this EOI doesn't guarantee any qualification to that tender .
4. We are attaching with this letter , the copies of original documents defining :-
 - a) The Respondent's legal status ;
 - b) Its principal place of business;
 - c) Its place of incorporation (if respondents are corporations); or its place of registration (if respondents are cooperative institutions, partnerships or individually owned firms);

- d) Self-certified financial statements of Last three years, clearly indicating the financial turn over and net worth.
 - e) Copies of any project undertaken for the last 5 years, in any Govt department.
5. We shall assist Irrigation and waterways Department, Govt. of West Bengal or its authorized representatives to obtain further clarification from us, if needed.
- a) Executive Engineer of Mechanical & Electrical Division, Midnapore, authorized representative, may contact the following nodal persons for further information on any aspects of the Response :

Sl No.	Contact Name	Address	Telephone	E-mail

6. This application is made in the full understanding that:
- a) Department Reserves the right to reject or accept any or all applications, cancel the EOI and subsequent bidding process without any obligations to inform the respondent about the grounds of same .
 - b) We confirm that we are interested in participating in the selection process through this EOI.
7. We certify that our turnover and net worth in the last three years is as under :

Financial Year	Turn over	Net worth

8. In response to the EOI we herby submitting the following details annexed to this application :
9. The undersigned declare that the statements made ad the information provided in the duly completed application are complete, true, and correct in every detail . We also understand that in the event of any information furnished by us being found later on to be incorrect or any material information having been suppressed , may delete our name from the list of potential bidders. We further understand that Irrigation and waterways Department, Govt. of West Bengal will give first preference to the applicants considered relevant for the purpose.

Yours sincerely,

(sign)

Name

In the Capacity of

Duly authorized to sign

The response for and on behalf of

15.0 TECHNICAL SPECIFICATION OF THE WORK

15.1.1 PUMPS (HORIZONTAL NON CLOG DRY INSTALLED SUBMERSIBLE (FLOOD PROOF))

15.1.1 Codes and Standards

The design, manufacture and performance of the pumps specified herein shall comply with the requirements of the applicable codes and standards, including but not limited to the following:

Sl	Standard	Title
01	IS: 325	Three phase induction motor.
02	IS : 4029	Guide for testing of 3 phase induction motor.
03	IS : 9137	Acceptance test for centrifugal, mixed flow, axial flow pumps.
04	IS : 5120	Technical specification for rotodynamic special purpose pumps.
05	IS : 15310	Hydraulic design of pump sump and intakes.
06	IS/IEC 60034-1	Rotating Electrical Machines (Part-1 : Rating & Performance)
07	IS: 9283	Motors of Submersible pumps
08	IS 10572	Method of Sampling pumps
09	IS 11346	Agricultural and Water supply pumps – code of acceptance

Where the above standards are in conflict with the stipulation of tender specifications, tender specification supersedes them. Any other International Standard may also be considered.

15.1.2 General

The pump shall be vertical, dry pit installed submersible, non-clog, single stage, mono block type driven by single speed submersible motor suitable for pumping all kinds of sewage/ sludge/ storm water containing plastics and fibrous materials. The pumps must have fitted with in-built cutting and tearing system for foreign matters. The speed of the pump should not be more than 750/1000 rpm. The pump efficiency shall not be less than 80%. The motor efficiency shall not be less than 80% and shall be non-overloading type. The motor should never be overloaded throughout the entire pump operating range as shown in the performance curve. The pump

Performance must be stable from zero discharge to run out condition.

No. of pumps	06
Discharge of each pump	2040 cubic Mtr/ Hr
Head	8.0 M
RPM of Pump	Below 1000
Pump Efficiency(minimum)	80 %
Lubrication	Motor will be oil cooled or ethylene glycol water mixture
Solid handling capacity of the pump	50 mm size

The pump head referred above is inclusive of all losses in the discharge in common header and pipeline of the pump. Inlet losses in column pipe, discharge head for individual pump shall be calculated by the bidder and included in the design head of bowl assembly. The Bidder shall submit design calculation of submersible pump and its accessories for approval to placement of supply order.

The pump shall have stable performance throughout the whole range of its operation i.e. from zero flow to run out condition. The pump of particular category shall be identical and shall be suitable for continuous operation. The flow rate and minimum submergence for continuous operation and maximum allowable dry running period of the pump shall be stated in their offered bid.

The design, manufacture and performance of the submersible pump-motor sets shall comply with the latest applicable Indian/ International standards. In particular, the equipment must conform to the latest revision of applicable specification. The pump shall be capable of developing the required total dynamic head at rated capacity and will be suitable for parallel and continuous operation. The head - capacity curve of the pump shall be continuously rising towards the shut-off with highest head at shut off. The pump shall be designed to be protected against reverse direction of rotation due to the sewerage returning through the pump. The set rotor assembly weight and unbalanced hydraulic thrust of the impeller shall be carried out by the thrust bearings provided in pump assembly. The pump shall operate trouble free, smooth and without any undue noise and vibrations.

15.1.3 Characteristic Curve

System head curve for the system is furnished along with the tender. The bidder shall furnish characteristic curves of pump after deducting column pipe losses etc. up to pump delivery flange. The bidder shall furnish with the tender the characteristic curve so prepared and superimposed on system head curve for single and multi pump operations (in parallel operation). The pump shall have stable characteristic over the entire range of working head. The pump shall be suitable for closed sluice valve i.e. shut off condition.

15.1.4 Design Requirements

The pump shall be capable of developing the required total head at rated capacity for continuous operation. The head discharge curve shall be continuously rising towards the shut off with highest shut off point. Pumps shall be identical and shall be suitable for parallel operation with equal load division. Impeller shall preferably be non- overloading type. Pump shall run smooth without undue noise and vibration. The magnitude of peak-to-peak vibration at shop and at site installation will be limited to 75 microns and 50 microns respectively at the bearing housing. Each pump of this pumping system must be capable of running satisfactorily in parallel operation of 06 nos. of 20 Cusec . Under extreme situation 06 pumps may also be operated at a time.

The pump set shall be of compact unitary construction. The pump casing shall be centrifugal volute casing type with the impeller mounted directly on to the extended solid motor shaft (without any coupling).

Pumps shall be designed and constructed satisfactorily operate and perform with in the designed conditions and the requirement specified herein.

The inlet passage of the suction casing shall be streamlined to avoid eddies.

The pump may be equipped with replaceable bearing and wearing ring, wherever provided.

The strainer on the suction shall offer the best compromise amongst restraining large solids from entering the pump and containing the suction losses to the minimum.

The pump shall be capable to give discharge without overloading the prime mover within the permissible current and rated voltage and supply frequency at minimum +5 percentages and minimum -15 percentage of the guaranteed duty point.

15.1.5 Features of Construction

15.1.5.1 Casing

The pump casing shall be of cast iron (FG 210 Grade FG260) or EN-JN 1040/ CG 25. Pump shall be of Robust construction and shall be tested to withstand hydrostatic pressure Test.. The pump casing, made of cast iron shall be hydrostatically tested at 1.5 times the shut-off head with maximum impeller size. The pump casing shall be of robust construction and the liquid passage in the casing shall be finished smooth.

15.1.5.2 Impeller

Impeller shall be enclosed or semi open type, cast in one piece and balanced both statically and dynamically and shall be made in one piece and also shall be fastened to the shaft in such a manner as to make it readily removable. The impeller shall be providing with wearing ring on it. The interior surfaces and passages shall be smooth finished, to obtain the highest efficiency and shall be designed to ensure smooth operation free from any cavitations or vibration. As raw water is being pumped, balancing holes / devices will not be accepted for balancing the hydraulic thrust. Impeller shall be material of Duplex Stainless steel /SS 316 L .

The non-clog, semi-open/ vortex type impeller will be both statically and dynamically balanced and will be keyed and positively held on the motor shaft. The impeller will also be secured against damages, if the direction of rotation should reverse due to liquid flowing backward through the pump. The impeller shall be capable of handling soft solids of minimum 100 mm x 100 mm size. The leading edge of the vanes shall be rounded and cut back to prevent rags, stringy materials etc. from impinging on the impeller vanes.

15.1.5.3 Impeller Shaft

The shaft shall be of adequate size to transmit required power.

The surface finish of the shaft or of the protecting sleeve of the pump sets having journal bearings shall not higher 0.75 Ra (Ref: IS 3073). Suitable sealing arrangement to be made to avoid contamination of pumped fluid.

The shaft, made of stainless steel shall be finished to close tolerance at the impeller and bearing diameters. The impeller shall firmly be secured to the shaft by key and/ or nuts. The size of the shaft shall be calculated on the basis of maximum combined stresses. While designing the shaft the critical speed of the shaft must be taken into account which shall be at least 20% above/ below the operating speed. The rotor shall be dynamically balanced to avoid any vibration during operation.

15.1.5.4 Seal

The pump shall have two mechanical seals in tandem arrangement.

15.1.5.5 Bearing

Maintenance free anti-friction deep grooved, permanently grease filled ball/ roller bearings should be provided and this should take care of axial and radial thrust at any point of operation.

15.1.5.5 Balancing

In case of 2- pole open well submersible pump set, the impeller and rotor shall be dynamically balanced to grade 6.3 of IS 11723 (Part-1).

In case of 4-pole open submersible pump set , the impeller shall be statically or dynamically balanced to grade 6.3 of IS 11723 (Part-1).

Balancing here means the balancing of the unbalanced rotating mass in the impeller and not balancing of the axial hydraulic thrust in the impeller.

15.1.5.5 Motor

15.1.5.5.1 Scope

The Motor shall be of continuous duty as specified in IS /IEC 60034-1.

Submersible Motor shall be capable to operate both in dry condition and submerged condition (dry pit flooded condition) . The motor shall be capable of delivering rated output with the terminal voltage differing from this rated value by not more than +/- 6 percentages and the frequency differing from its rated value by not more than +/- 3 percentages.

The scope of this Section covers design, manufacture, supply, installation, testing and commissioning of A.C induction electric motors for all electrically driven pumps and other equipment

15.1.5.5.2 Ambient Conditions

The motors shall be suitable for continuous operation at rated load for maximum ambient temperature of 50 C and maximum relative humidity of 100%, the maximum temperature and humidity not occurring simultaneously.

15.1.5.5.3 Standards & Codes

All the motors shall be conforming to the following IS specification:

IS 325, 2223, 1231, 4691, 2540

IEC 34, 72: AC induction motors

15.1.5.5.4 Electrical System

Voltage	33KV/ 415 V (earthed)
Motors	415 Volts A.C Squirrel cage
Short Circuit Level	1500MVA Symmetrical at 33KV and 35MVA `Symmetrical at 415 volts
L T Voltage	415 volts, 3 phase, 4 wire.
Frequency	50 Hz \pm 3%
System Neutral	Directly earthed.

15.1.5.5.5 Operational requirement

The motors shall be designed to operate continuously (S1 duty) at its rated output over the entire range of the output of the driven equipment. It shall be also have at least 15% margin over the input power requirement of the driven equipment at rated output duty point. The motor characteristics shall match with the requirements of the driven equipment so that adequate starting torque, pull up pull out and full load torques is available for the intended service. The motor GD2 value must be greater than the GD2 value of the driven equipment and shall be so designed as to give smooth and uniform starting and running of the driven equipment at all load conditions.

The motors shall be designed to run continuously at rated output over the entire range of voltage and frequency variations. The motors shall be capable of operating satisfactorily at 'its' full load for 15 minutes without injurious heating with 75% rated voltage at motor terminals.

All motors up to 15 KW/20 HP shall be designed for operation on $415V \pm 10\%$, $50 \text{ Hz} \pm 3\%$ AC with either Direct On Line (DOL) starting at full voltage, starting current not exceeding 6 times full load current or Auto Transformer Starting (ATS) with starting current not exceeding 3 times. Motors above 15 KW/20 HP and up to 180 KW / 240 HP shall be designed for operations on $415 \text{ V} \pm 10\%$, $50 \text{ Hz} \pm 3\%$ A.C. with Fully Automatic Star Delta (FASD) starter with starting current not exceeding 3 times. On Line (DOL) starting as called for and the starting current shall not exceed 6 times the full load current. The crane motors wherever specified shall be of suitable for frequent operations in both the directions and shall be inching / plugging duty type. The crane motors shall be selected at least 50% higher capacity to meet the duty requirement. All the stator winding terminals and other items like space heaters, embedded temperature detectors bearing temperature detectors (DE & NDE),etc. shall be brought out to separate terminal boxes as per IS as per requirement. All motors shall be suitable for bi directional rotation unless otherwise specified.

All motors driving pump units shall be protected against dry running of the pumps through suitable sensing devices like float/level sensing switches/probes and the total sensing device along with all the relevant control apparatus and wiring and cabling shall be included in the scope of work.

The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. Motor shall start with rated load and accelerate to full speed with 80% rated voltage at motor terminals. Motor shall be capable of six equally spread starts per hour, three starts in quick successions from cold conditions and three restart from hot conditions.

During starting of large motor the supply voltage may drop up to 85% of the rated voltage for a period of 60 seconds. All electrical equipment while running shall successfully over ride such period without affecting proper performance of other motors and the electrical system. No of poles for HT Motors under use here of 12 pole & 10 pole for LT Motors under use as in BOQ.

Motors subject to reverse rotation shall be designed to withstand the stresses encountered when starting the non-energized shaft rotating at 125% rated speed in reverse direction. Provision for HT & LT Capacitor Banks across motor terminals should be provided as per specification.

15.1.5.6 Provision for earthing

Earthing of the motor shall be done as per IS 9283 in accordance with the relevant provisions of IS 3043. For satisfactory purpose it shall be ensured during installation that the earthing is capable of taking care of leakage current. In case of PVC pipe no. 52 used as discharge pipe,

a separate non corrosive, low resistance conductor from earth terminal to control panel earth terminal shall be provided for earthing. In case of non corrosive GI pipes and clamps are used for the purpose of earthing the motor, earthing connection may be made to the discharge pipe clamp and to the control panel earth terminal.

15.1.5.7 Terminal marking and direction of rotated

Terminal marking shall be in accordance with IS 9283. The direction of rotation of pump set is designated clockwise or anti-clockwise as observed when looking at the pump shaft from the driving end. The direction of rotation shall be clearly and securely marked by incorporating an arrow on the pump set.

15.1.5.8 Dimensions and tolerances

Since the open well submersible pump sets are meant for use in open wells only. The overall dimensional and tolerance requirement is at the discretion of manufacturer.

15.1.5.9 Cable

A watertight Cable junction Box sealed from the motor shall be provided for the motor power and signaling cables. The cable shall be of minimum 35 m to be terminated in MCC (Minimum 35 mtr. Length without any joint). It should be Copper Cored, Dual sheathed EPRS / PVC type.

A water tight cable junction box sealed from the motor shall be provided for the motor power and signaling cables complete with all external corrosion resistant cable glands. The cable shall be brought directly out of the submersible motor without joints, and shall be of sufficient length, minimum 20 m to be terminated in an IP 67 junction box (in the scope of electrical contractor) outside adjacent to the wet well. They shall be sized in accordance with the electricity utility regulations and BS 7671.

The size of the conductor shall be adequate and suitable for continuous use under water and air. If four core cables is used , the fourth core is to be used for earthing.

15.1.5.10 Internal protection of pump-motor set

The pump sets shall at the minimum be provided with the following internal protections. The leads of all the protecting sensors shall be brought out from the motor with separate control cables.

15.1.5.11 Winding Temperature

The motors shall be provided with 3 sets of PT 100 type thermistors embedded in the winding to protect it from getting overheated.

15.1.5.12 Bearing Temperature

For detection of mechanical faults, both bearings, at drive end and non-drive end shall be provided with PT 100 type temperature sensors for monitoring the bearing temperature, protection and annunciation.

15.1.5.13 Moisture sensor

The motors shall be provided with a resistance type sensor to sense entry of any moisture in the motor chamber. It shall operate on 230 V AC supply.

15.1.5.14 Monitoring seal leakage chamber

The pump set shall be provided with in-built sensor assembled in the seal leakage collection chamber. In the event of any leakage this sensor will give the tripping signal. The sensor should be sensitive enough to sense the smallest leakage so that the motor does not burn out.

15.1.5.15 Stuffing box/ oil chamber

1. The pressurized entry of water into the motor (From the pump's volute casing) should be prevented by two separate mechanical seals in mounted in a tandem mode within an oil chamber.
2. The primary (Inboard) seal should be of silicon carbide or tungsten carbide faces to withstand erosive wear due to any silt particles. The secondary (Outboard) seal should be of carbon v/s Cast Chrome Molybdenum
3. The pressurized entry of water into the motor (from the pump's volute casing) should be prevented by Two separate mechanical seals in mounted in a tandem mode within an oil chamber. The Primary (Inboard) seal should be of silicon Carbide or tungsten Carbide faces to withstand erosive wear due to any silt particles. The secondary (Outboard) seal should be of Carbon v/s cast chrome Molybdenum Steel or silicon Carbide or Tungsten Carbide – i.e. thermally Unstable materials like Alumina / aluminum Oxide shall not be allowed.
4. Seals must be capable of withstanding rotation in either direction.
5. A detector shall indicate when moisture is leaking past the first seal
6. These mechanical seal should be of bi – directional mechanical seals permitting reverse running due to accidental back flow.

15.1.5.16 DUTY POINT EFFICIENCY:

The pumps shall have Maximum efficiencies at corresponding Duty points as specified in B.O.Q. The tenderer should calculate the above efficiency and specify the same in their offers along with calculations. The curves for both types of efficiencies (Bowl and overall), for

Entire range, starting from Shut off to Static head, should be invariably submitted along with the offer.

15.1.5.17 HEAD RANGE AND PARALLEL OPERATIONS:

The pumps will satisfy the Head requirement as per the System Resistance Curves, while operating in Solo and in any combination up to maximum nos. in parallel, as specified in B.O.Q. The Pumps shall be suitable for operation in Head range as specified in B.O.Q. The system Resistance Curves are enclosed with the documents and will be treated as tender document. Normally, maximum nos. of pumps would be operating through each Rising Main as mentioned in B.O.Q.

15.1.5.18 POWER MARGIN

The pump shall be capable of operating in the range as mentioned above, without being Overloaded at any point and keeping a margin of at least 10% of Power in the Motor of Pump over entire Operating range. Requirement at Shut off, should not exceed Power requirement at Duty point. The pump should be capable of starting against fully closed butterfly valve without being overloaded at any point up to valve fully open.

15.1.5.19 PUMP CHARACTERISTICS

The pump characteristic shall be of Stable nature and such that, the efficiency is fairly steady for the water level variations as mentioned in the foregoing clauses. The maximum efficiency point will be nearer to the duty point and fairly constant for larger range on either side. The pumps should run smoothly from lowest head to Shut off point without Cavitation and Vibration (within H.I.S. limitations for vibration). The variation in the efficiencies for any point of operation in entire Operating range should be minimum.

15.1.5.20 NPSH CONDITIONS (NET POSITIVE SUCTION HEAD CONDITION)

NPSH required by the Pumps offered by bidder, should be lesser by at least 0.5 meters than N.P.S.H.A. at Duty point; and shall not exceed the N.P.S.H. available at any point of operation in the range, with Solo and Parallel operations. The Bidder shall take the following values of corresponding Parameters for purpose of calculations of N.P.S.H.A. at the site.

- | | | | |
|-----|---|---|------------------|
| i) | Atmospheric Pressure
of water | : | 9.6 Meter column |
| ii) | Vapour pressure of water
column of water | : | 0.6674 meters |

(At 37.8 degree C Normal temperature)

15.1.5.21 SPEED

PUMP speed shall not exceed that specified in schedule B.O.Q.

15.1.5.22 SOLID HANDLING CAPACITY

The Pump shall be suitable for pumping of Raw river water containing Silt, Sand and suspended Solids up to 50 mm size. If required suitable preventive special alloy coating needs to be provided to the impellers and castings to avoid any damage, due to abrasive material in raw water.

15.1.5.23 Material of Construction

Casing	: Cast Iron, IS: 210, FG 260
Impeller	: Duplex Stainless Steel /SS 316L
Shaft	: Stainless Steel, AISI: 410
Motor housing	: Cast Iron, IS: 210, FG 260
Stator/ rotor core	: CRGO Steel
Stator/ rotor winding	: Electrolytic grade copper wire/ bar
Fasteners	: Stainless Steel, AISI: 316

Material of Construction of any other International Standard may also be considered.

15.1.5.24 Acceptable Make

KBL/KSB/ XYLEM/FLIGHT/WILO/MBH or equivalent

15.1.5.25 CLASS OF OPERATION

The Pump shall be suitable for nonstop continuous 24 hours operation without interruptions

15.1.5.26 SUMP MODEL TESTING

The sump Model study should be carried out and report of the same should be made available to the department before work. It is mandatory on the part of the Contractor to carry out sump model study at his own cost and at the earliest after the issue of the Work order. The Contractor must fully satisfy himself about the suitability of the proposed design and layout of the Sump, to ensure Vortex free and cavitation free operation of the Pumps. Minor modification to the Sumps as are acceptable to the Department, and as possible considering the then stage of civil works, will be carried out at the cost of department, as per contractor's proposal in writing. The sump model analysis results in triplicate of the Contractor's Sump model testing, should immediately be sent to the Engineer-in-charge, along with proposals of the Contractor if any, for his consideration.

If the changes proposed by the Contractor in the design of the Sump are not acceptable to the Department, considering the stage of Civil works construction, it is mandatory on the part of the Contractor, to modify the design of his equipment, to the extent possible, which would suit the Sump finalized by the Department; and to ensure hydraulically smooth operation. Such modification in the design of the equipment is deemed to be covered under the Rate quoted for the item.

15.1.5.27 INDUCTION MOTOR

The Motor shall be of continuous duty as specified in IS /IEC 60034-1.

Submersible Motor shall be capable to operate both in dry condition and submerged condition (dry pit flooded condition) . The motor shall be capable of delivering rated output with the terminal voltage differing from this rated value by not more than +/- 6 percentage and the frequency differing from its rated value by not more than +/- 3 percentage .

Induction Motor (submerged) design The motor shall be of squirrel Cage, Induction type, Air Filled yet capable of Water Immersion upto 20 mwc for S1 duty – Motors with Oil or Water filled windings shall not be allowed.

The motor shall be rated for 415 +/- 10% V, 3 phase 50 +/-5% c/s A.C. Its winding should be of Class “H” insulation * (withstanding winding hot spot temperature of up to 185 degree C respectively) while the nominal temp rise of winding hotspot should not exceed that of class “B”.

Motor shall be capable of starting and accelerating the load with the applicable method of starting without exceeding the acceptable winding temperatures, when the supply voltage is in the range of 10% above of the rated motor voltage.

Motor shall be designed to withstand 120% of the rated speed for two minutes without any mechanical damage in either direction of rotation.

The motor should be wound using Dual Coated, Super Enameled; copper wire with high temperature index as per I.S. 4800 Part-13, PVC / Poly propylene – poly ethylene insulation for winding wires shall not be allowed. Motor’s Insulation should be Vacum Varnish Impregnated & Oven Baked to ensure a Moisture Imprevious & Mechanically Robust insulation. Dip or Pour type Air Dry Varnishing shall not be allowed.

15.1.5.28 MOTOR PROTECTION

Thermal Overload Protectors (Bi Metallic Over Load relays) should be embedded in each phase of the stator winding & drive End (Thrust) Bearing housing to detect overheating & trip the motor from the control panel in the event of the temperature exceeding the safe operating limit (above 130 degree C for winding & above 90 degree C for bearings). The operational logic of these TOP’s shall be NC while at fault they should Open Circuit at 240 V mains.

To detect primary Mechanical Seal’s Leakage a Moisture Sensor shall be provided in intermediately Oil Chamber (& not in the Motor casing or elsewhere) – this shall detect water mixing in oil by mode of increased leakage current from the moisture sensor.

15.1.5.29 TESTING

The pumpsets shall be tested at the works of the manufacturer in accordance of IS 9137 at the test bench of the manufacturer.

To ascertain compatibility of pump set with soft Starter, the pumpsets shall be preferably tested on Soft starter (in accordance if ISO 9906 or IS 5120). After the testing of the pump at rated speed has been completed, placing the pump on the rated duty point at 50 Hz : the speed shall then be reduced to 90, 80 & 70% (of full speed) to ascertain the stable performance of the pumpset at reduced speed. During this operation, there should be no vibration or current fluctuations.

The flow shall be measured by preferably by Full Bore Electro-Magnetic or Ultrasonic Flow Meters but compulsorily with mensuration inaccuracy not exceeding 0.5%.

In case of MNC pump manufacturers not having adequate testing facility within reasonable distance (i.e. decided by the area of operation of the TPI); the pumps should be tested at the Alternative Test Bed or at Field within 30 days of installation which the contractor/manufacturer is bound to offer at no extra cost. The Field Testing shall include the following. :

1. Motor routine Tests : IR, HV, No Load Amperes, Vibration, etc routine and type tests in accordance with IS : 4029 and IS : 325 at the manufacturers works shall be offered. Test certificates shall be endorsed to the effect that they are properly balanced and free from vibration. In addition, a test shall be required to establish the maximum transient starting current.
2. Pump Performance Testing (in accordance with IS 5120 / IS ISO 9906, Grade 2 – 5% / ISO 2548 – 5%) : Measurement of Head, Discharge, Motor Input at least 6 different points to plot the Actual Performance Curves.
3. All the Extra Charges for such Field Testing shall be borne by the Contractor. It is clarified that, in case of Field Testing Failure : the customer reserves the right to detain the pumps in their custody until the contractor replaces the failed pumps with New pumps which shall again be subjected to Re-Testing. No extra charges shall be paid by MKVDC to the contractor.

A) INTERLOCKS

1. The pump will not be start unless water level indicator command is passed on.
2. The pump should be stopped as soon as water level decreases below POL.

15.1.5.30 HYADROSTATIC TEST / SYNAMIC BALANCING / DYE PENETRATION TEST FOR SCF PUMP

All pumps bowl assembly shall be subjected to hydrostatic test at manufacturer's works. The test pressure shall either be one and one half times the shut off head developed by pump bowl assembly or twice the rated head whichever is greater, applied for standard type. Unless other wise stated the minimum duration of testing will be 30 minutes.

All pumps discharge heads and columns up to 10% shall be subjected to hydrostatic test pressure as specified at (1) above.

All major rotating components must be statically balanced individually. In addition to static balancing of individual component the whole rotor assembly of pump must be dynamically balanced at rated operational speed.

Dynamic balancing test of impellers and impeller shaft together shall be arranged at manufacturers works, which will be witnessed by engineers, (as per IS 1940 – 197311).

Dye penetration test for impellers shall be arranged at manufacturers works which will be witnessed by engineers.

15.1.5.31 PERFORMANCE TEST AT FACTORY FOR PUMP

All pumps shall be subjected to performance test as per IS 10981 – 1983 at manufacturers works at full load and full speed by using one of the type electric motor for respective pump to be supplied under these contract as prime mover. Performance testing shall include determination of head, discharge, power demand and efficiency over a range of cut off to shut off head.

Each assembled pump shall be shop tested by the manufacturer, in presence of Engineer to determine the following characteristics as furnished in the characteristics curve.

1. Capacity vs. Total Dynamic Head curve
2. Capacity vs. Brake Power (BKW) curve
3. Capacity vs. Efficiency (%) curve

The above tests for each pump for its full operating range at rated speed shall be conducted in accordance with the latest revision of IS/ BS/ DIN/ ISO specifications and/ or Hydraulic Institute Standards, USA. While testing the bearing temperature are also to be recorded.

Each pump performance shall be documented by obtaining concurrent readings showing motor voltage and amperage, pump suction head, pump discharge head, pump discharge etc. Such readings shall be documented for at least even pumping conditions including one at the shut-off head and each power load shall be checked for proper current balance.

The curves produced from the above readings shall be used to determine the capability of pump sets to meet the guaranteed performance at site. Bearing temperatures shall be determined by PT 100 or equivalent type temperature detector. A running time of at least 30

minutes shall be maintained for this test at shut off head if sufficient water is not available for a complete test.

All instruments and equipment required for such test shall be provided by the manufacturer and the instruments shall be calibrated and certified by approved independent testing authority not more than 15 days prior to the test in which they will be used.

In the event of any pump failing to meet the specified test requirements, it shall be modified and retested until the requirements are attained.

15.1.5.32 OTHER INSPECTIONS AT FACTORY FOR SCF PUMPS

Contractor shall arrange for the following inspection at manufacturers works. Inspection for critical dimensions to components .Inspection for verification of metallurgy of various components by review in metallurgical tests carried out by manufacturer. Inspection for machining or finished quality and undue wear of fast moving parts after trial runs by stripping down the machine. Inspection for verification of test observation and reports for stress relieing of components, specified earlier in the detailed specification. X-ray test for impeller shaft shall be arranged at manufacturer's works, which will be witnessed by engineer.

15.1.5.33 Non Destructive Tests

Physical and chemical tests of the major components of each pump must be done. These tests shall be conducted in accordance with relevant IS/ BS/ DIN/ ISO standard.

15.1.5.34 Testing at Site

All pump sets shall be tested at site in presence of manufacturer's expert .The efficiency, Discharge, Head shall be measured with the electromagnetic flow meter installed at the discharge pipe line. The testing shall be arranged by the contractor at no extra cost.

15.1.5.35 TEST REPORT AND DOCUMENT FOR PUMPS

Contractor shall furnish to the engineer following document before dispatch of material:

Test report for chemical analysis of materials of construction for major components like impellers, pump shaft, bowl assembly, etc.

Pump performance test reports with sample calculation and actual pump performance curve and pump performance test acceptance reports.

Other test and inspection report as above.

Final constructional drawings of the pump

Operation maintenance and spare part manual for pumps.

Test certificate of motor confirming to IP68 standards.

15.1.5.36 MARKING AND PARAMETERS TO BE DECLARED BY THE MANUFACTURES

A nameplate of corrosion resistant material shall be affixed on the pump sets with the following details:

- (a) Motor Rating (KW)
- (b) Delivery size in mm
- (c) Type/Model
- (d) Type of Motor – INDUCTION MOTOR- (CSIR/CSCR/CSR)
- (e) Rated voltage with variations
- (f) Rated Current
- (g) Rated Frequency
- (h) Rated speed
- (i) Number of phases
- (j) Category of Motor
- (k) Winding connection (STAR/DELTA/STAR-DELTA)
- (l) Type of duty
- (m) Numbers of pole
- (n) Head in meters declared duty point
- (o) Dischage at declared duty point
- (p) Overall efficiency at declared duty point
- (q) Operating head range for overloading requirements
- (r) Number of stages
- (s) Minimum submergence

(t) Manufacture's name or trademark

(u) Serial number

16.0 Guranteed Technical Particulars (To be filled by the Bidder)

(Without these filled in sheets, offers are liable to be rejected. Fill in all gaps. If not applicable mark N.A)

16.1 NON CLOG, SUBMERSIBLE, FLOOD PROOF, CENTRIFUGAL PUMP (DRY PIT INSTALLATION)

Sl. No	Description	Details
1.0	General	
1.1	Manufacturer	
1.2	Model Number	
1.3	Type of pump	
1.4	Whether suitable for parallel operation	
2.0	Guaranteed performance	
2.1	Rated capacity, m ³ /hr.(Specify tolerance limit)	
2.2	Guaranteed bowl head rated capacity, MWC	
2.3	Shut-off head, MWC	
2.4	Pump efficiency at rated capacity, % (Specify tolerance limit)	
2.5	Performance testing and design standard	
2.6	Maximum flow through pump, m ³ /hr	
2.7	Minimum flow through pump, m ³ /hr.	
2.8	Range of operation of pump	
2.9	The pumps offered have continuously rising	
2.10	Maximum solid handling capacity, mm. dia. duty points towards shut-off point and they have stable raising H-Q curves within the range of operation.	
2.11	Maximum solid handling capacity, mm. dia.	
2.12	Permissible concentration of solids, pap	
2.13	Guaranteed power consumption at motor terminals per pump at rated capacity, KW	
2.14	Pump input power at Shut-off, KW	

2.15	Maximum power consumption of pump throughout the entire range of operation, KW	
2.16	Power requirement due to overloading of pump in the event of tripping one or more pumps operating in parallel, KW	
2.17	Recommended motor rating, KW	
2.18	Pump runaway speed, RPM	
2.19	Pump specific speed (As per IS 5120)	
2.20	Specific gravity, temperature of liquid pumped	
2.21	Pump suction specific speed	
2.22	NPSH required at rated flow, MWC	
2.23	NPSH required at maximum flow, MWC	
2.24	Loss in line shaft bearing	
2.25	Loss in thrust bearing	
2.26	Total head loss	
2.27	Head loss at bowl entrance, bell mouth & suction casing	
2.28	Bowl efficiency	
2.29	Overall efficiency of pump motor set.	
2.30	Pump motor set capable of starting with :-a) Discharge valve closed b) Discharge valve open c) Discharge valve partly open	
2.31	Maximum Noise Level dB (A)	
2.32	GD ² value of rotor assembly, k-m ²	
3.0	Design & construction features	
3.1	Applicable standard	
3.2	Type of casing	
3.3	Whether back pull out type design	
3.4	Pump duty	
3.5	Range sustained period of operation	
3.6	Maximum suction lift available at design capacity, MWC	
3.7	Torque-speed curve of the pump and drive motor furnished with the offer.	
3.8	Maximum flow the pump can handle without over heating, m ³ /hr.	

3.9	Whether pump is so designed that the pump internals can be attended without disturbing the discharge & suction piping.	
3.10	Runaway speed of the pump (Under reverse rotation) and corresponding head, RPM/MWC	
3.11	Impeller type	
3.12	Impeller diameter	
3.13	Minimum angle (Degree)	
3.14	Minimum angle (Degree)	
3.15	Actual for specific duty	
3.16	Delivery nozzle with flange standard	
3.17	Column shaft assembly	
3.18	Column shaft length (Total), mm	
3.19	Pump line shaft bearing	
3.20	Maximum flow, m/sec.	
4.0	Net weight	
4.1	Weight of pump assembly, kgs.	
4.2	Weight of motor only, kgs.	
4.3	Weight of column pipe assembly, kgs.	
4.4	Weight of heaviest piece to be handled by EOT crane, kgs.	
5.0	Dimensions	
5.1	Whether G.A. drawing for pump already attached	
6.0	Tests and inspection	
6.1	Tenderer is agreeable to carry out all inspection and tests as outlined in the 'Standard specification' & third party inspection.	
6.2	If "No" furnish details	
7.0	Drawings	
7.1	All the tender drawings, characteristic curves and catalogues are furnished with the offer.	
7.3	If "No" furnish details	
7.3	All the specified drawings to be submitted for approval	
7.5	If "No" furnish details	

Sd/- A.K. Ghosh
Executive Engineer
Mechanical & Electrical Division, Midnapore,
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Memo No: 17/3/3T-1(e)

Date: 18.01.2023

Copy forwarded for information and taking necessary action please for wide publication to: -

1. The Chief Engineer, Mech. & Elect., I&W Directorate, 2nd Floor, Jalsampad Bhawan, Govt of West Bengal.
2. The Superintending Engineer, South-West Mechanical & Electrical Circle, DVC New Colony, Durgapur-2, Paschim Bardhaman, Pin- 713202.
3. Office Notice Board.

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